SEQUENCE LISTING

<110> NATIONAL UNIVERSITY CORPORATION NARA INSTITUTE OF SCIENCE
AND TECHNOLOGY
RESEARCH INSTITUTE OF INNOVATIVE TECHNOLOGY FOR THE EARTH
KINKI UNIVERSITY
YOKOTA, Akiho
SHIGEOKA, Shigeru
TOMIZAWA, Ken-ichi

<120> METHOD FOR IMPROVING PRODUCTIVITY OF PLANT BY CHLOROPLAST
TECHNOLOGY

<130> 2006_1303A

<140> US 10/591,752
<141> 2006-09-01

<150> PCT/JP2005/004037
<151> 2005-03-02

<150> JP 2004-059513
<151> 2004-03-03

<160> 18

<170> PatentIn version 3.4

<210> 1
<211> 358
<212> PRT
<213> Spinacia oleracea L

<220>

<223> Fructose-1,6-bisphosphatase

<400> 1

Ala Ala Val Gly Glu Ala Ala Thr Glu Thr Lys Ala Arg Thr Arg Ser
1   5   10   15

Lys Tyr Glu Ile Glu Thr Leu Thr Gly Trp Leu Leu Lys Gln Glu Met
                20   25   30

Ala Gly Val Ile Asp Ala Glu Leu Thr Ile Val Leu Ser Ser Ile Ser
            35   40   45

Leu Ala Cys Lys Gln Ile Ala Ser Leu Val Gln Arg Ala Gly Ile Ser
        50   55   60

Asn Leu Thr Gly Ile Gln Gly Ala Val Asn Ile Gln Gly Glu Asp Gln
65   70   75   80

Lys Lys Leu Asp Val Val Ser Asn Glu Val Phe Ser Ser Cys Leu Arg
                85   90   95

Ser Ser Gly Arg Thr Gly Ile Ile Ala Ser Glu Glu Glu Asp Val Pro
        100   105   110

Val Ala Val Glu Glu Ser Tyr Ser Gly Asn Tyr Ile Val Val Phe Asp
        115   120   125

Pro Leu Asp Gly Ser Ser Asn Ile Asp Ala Ala Val Ser Thr Gly Ser
        130   135   140

Ile Phe Gly Ile Tyr Ser Pro Asn Asp Glu Cys Ile Val Asp Ser Asp
145   150   155   160

His Asp Asp Glu Ser Gln Leu Ser Ala Glu Glu Gln Arg Cys Val Val
          165   170   175

Asn Val Cys Gln Pro Gly Asp Asn Leu Leu Ala Ala Gly Tyr Cys Met
        180   185   190

Tyr Ser Ser Ser Val Ile Phe Val Leu Thr Ile Gly Lys Gly Val Tyr
        195   200   205

Ala Phe Thr Leu Asp Pro Met Tyr Gly Glu Phe Val Leu Thr Ser Glu
      210   215   220

Lys Ile Gln Ile Pro Lys Ala Gly Lys Ile Tyr Ser Phe Asn Glu Gly
225   230   235   240

Asn Tyr Lys Met Trp Asp Asp Lys Leu Lys Lys Tyr Met Asp Asp Leu
          245   250   255

Lys Glu Pro Gly Glu Ser Gln Lys Pro Tyr Ser Ser Arg Tyr Ile Gly
        260   265   270

Ser Leu Val Gly Asp Phe His Arg Thr Leu Leu Tyr Gly Gly Ile Tyr
        275   280   285

Gly Tyr Pro Arg Asp Ala Lys Ser Lys Asn Gly Lys Leu Arg Leu Leu
        290   295   300

Tyr Glu Cys Ala Pro Met Ser Phe Ile Val Glu Gln Ala Gly Gly Lys
305   310   315   320

Gly Ser Asp Gly His Gln Arg Ile Leu Asp Ile Gln Pro Thr Glu Ile
        325   330   335

His Gln Arg Val Pro Leu Tyr Ile Gly Ser Val Glu Glu Val Glu Lys
        340   345   350

Leu Glu Lys Tyr Leu Ala
        355

<210>   2
<211>   1074
<212>   DNA
<213>   Spinacia oleracea L

<220>

<223>   Fructose-1,6-bisphosphatase

<400>   2

```
gcagccgtag gagaggcggc tacagaaaca aaggcaagga ctagaagtaa gtacgaaatt      60

gaaacactaa caggctggct gcttaaacaa gaaatggcag gtgttattga tgctgaactt     120

accatcgttc tttctagcat ttcattggct tgtaaacaaa ttgcttcctt ggttcaacga     180

gctggtattt ctaacttgac tggaattcaa ggtgctgtca atatccaagg agaggatcag     240

aagaaacttg atgttgtctc caatgaggtg ttttcgagct gcttgagatc gagtggaaga     300

acaggaataa tagcatcaga agaagaggat gtaccagtgg cagtggaaga gagttactct     360

ggaaactata ttgttgtgtt tgatccactt gatggttcat ccaacattga tgcagctgtc     420

tccactggtt ccatctttgg catttatagc cctaacgatg agtgcattgt tgactctgat     480

cacgacgatg agtcacagct aagtgcagaa gaacagaggt gtgtagtgaa tgtatgtcaa     540

ccaggggata acctattagc agcagggtat tgtatgtact caagctctgt tatcttcgta     600

cttacaattg gtaaaggtgt gtatgcattc acattagatc caatgtatgg tgaattcgta     660

ctcacttcag agaaaatcca aatcccaaaa gctgggaaga tctattcatt caatgaaggt     720

aactacaaaa tgtgggatga taaattgaag aagtacatgg atgatcttaa agagccagga     780

gagtcacaga aaccgtactc gtctcgttac atagggagtt tagttgggga ctttcataga     840

acacttttat atggtgggat ttatggttac ccaagagatg caaagagtaa gaatgggaaa     900

ttgaggcttt tgtatgaatg tgcacctatg agttttattg ttgaacaagc tggtggtaaa     960

ggttctgatg gtcatcaaag aattcttgac attcaaccca ccgagataca tcaacgtgtg    1020

ccactgtaca tcgggagtgt ggaggaagta gagaaattag agaagtactt agca          1074
```


<210>   3
<211>   333
<212>   PRT
<213>   Spinacia oleracea L

<220>

<223>   Sedoheptulose-1, 7-bisphosphatase

<400> 3

```
Val Asn Lys Ala Lys Asn Ser Ser Leu Val Thr Lys Cys Glu Leu Gly
1               5               10              15

Asp Ser Leu Glu Glu Phe Leu Ala Lys Ala Thr Thr Asp Lys Gly Leu
                20              25              30

Ile Arg Leu Met Met Cys Met Gly Glu Ala Leu Arg Thr Ile Gly Phe
            35              40              45

Lys Val Arg Thr Ala Ser Cys Gly Gly Thr Gln Cys Val Asn Thr Phe
        50              55              60

Gly Asp Glu Gln Leu Ala Ile Asp Val Leu Ala Asp Lys Leu Leu Phe
65              70              75              80

Glu Ala Leu Asn Tyr Ser His Phe Cys Lys Tyr Ala Cys Ser Glu Glu
                85              90              95

Leu Pro Glu Leu Gln Asp Met Gly Gly Pro Val Asp Gly Gly Phe Ser
            100             105             110

Val Ala Phe Asp Pro Leu Asp Gly Ser Ser Ile Val Asp Thr Asn Phe
            115             120             125

Ser Val Gly Thr Ile Phe Gly Val Trp Pro Gly Asp Lys Leu Thr Gly
    130             135             140

Val Thr Gly Arg Asp Gln Val Ala Ala Ala Met Gly Ile Tyr Gly Pro
145             150             155             160

Arg Thr Thr Tyr Val Leu Ala Leu Lys Asp Tyr Pro Gly Thr His Glu
            165             170             175

Phe Leu Leu Leu Asp Glu Gly Lys Trp Gln His Val Lys Glu Thr Thr
            180             185             190

Glu Ile Asn Glu Gly Lys Leu Phe Cys Pro Gly Asn Leu Arg Ala Thr
            195             200             205

Ser Asp Asn Ala Asp Tyr Ala Lys Leu Ile Gln Tyr Tyr Ile Lys Glu
    210             215             220

Lys Tyr Thr Leu Arg Tyr Thr Gly Gly Met Val Pro Asp Val Asn Gln
225             230             235             240
```

```
Ile Ile Val Lys Glu Lys Gly Ile Phe Thr Asn Val Ile Ser Pro Thr
             245         250                 255

Ala Lys Ala Lys Leu Arg Leu Leu Phe Glu Val Ala Pro Leu Gly Phe
             260             265             270

Leu Ile Glu Lys Ala Gly Gly His Ser Ser Glu Gly Thr Lys Ser Val
             275             280             285

Leu Asp Ile Glu Val Lys Asn Leu Asp Asp Arg Thr Gln Val Ala Tyr
    290             295             300

Gly Ser Leu Asn Glu Ile Ile Arg Phe Glu Lys Thr Leu Tyr Gly Ser
305             310             315             320

Ser Arg Leu Glu Glu Pro Val Pro Val Gly Ala Ala Ala
             325             330
```

```
<210>  4
<211>  999
<212>  DNA
<213>  Spinacia oleracea L

<220>

<223>  Sedoheptulose-1,7-bisphosphatase

<400>  4
gtgaacaagg caaagaactc ttcccttgta accaaatgtg aacttggtga cagtttggag    60

gagttcctag caaaggcaac cacagataaa gggctgatta gattgatgat gtgcatggga   120

gaagcattaa ggaccattgg ctttaaagtg aggactgctt catgtggtgg aactcaatgt   180

gttaacacct ttggagacga acagcttgcc attgatgtgc ttgctgacaa gcttcttttc   240

gaggcattga actattcaca cttctgcaag tatgcttgtt cagaagaact ccctgagctt   300

caagatatgg gaggccccgt tgatggcgga ttcagtgtag catttgaccc ccttgatgga   360

tccagcattg tcgataccaa tttctcagtt gggaccatat cggggtttg gccaggtgac    420

aagctaactg gtgtaacagg cagagatcaa gtggctgctg caatgggaat ttatggtcct   480

aggactactt atgttctcgc tcttaaggac taccctggca cccatgaatt tcttcttctt   540

gatgaaggaa agtggcaaca tgtgaaagaa acaacagaaa tcaatgaagg aaaattgttc   600

tgtcctggaa acttgagagc cacttctgac aatgctgatt atgctaagct gattcaatac   660

tatataaaag agaaatacac attgagatac actggaggaa tggttcctga tgttaaccag   720

atcatagtga aggagaaagg tatattcaca aatgtaatat cacctacagc caaggcaaag   780

ttgaggttac tgtttgaggt agctcctcta gggttcttga ttgagaaggc tggtggtcac   840
```

```
agcagtgagg gaaccaagtc tgtgttggac attgaagtca aaaaccttga tgacagaacc      900

caagttgctt acggctcctt gaacgagatc atccgatttg agaagacact atacggatcc      960

tctaggctag aggagccagt tcctgttgga gctgctgct                             999
```

<210> 5
<211> 356
<212> PRT
<213> Synechococcus

<220>

<223> fructose-1,6-bisphosphatase/sedoheptulose-1,7-bisphosphatase from
Synechococcus PCC 7942

<400> 5

```
Met Glu Lys Thr Ile Gly Leu Glu Ile Ile Glu Val Val Glu Gln Ala
1               5                   10                  15


Ala Ile Ala Ser Ala Arg Leu Met Gly Lys Gly Glu Lys Asn Glu Ala
                20                  25                  30


Asp Arg Val Ala Val Glu Ala Met Arg Val Arg Met Asn Gln Val Glu
                35                  40                  45


Met Leu Gly Arg Ile Val Ile Gly Glu Gly Glu Arg Asp Glu Ala Pro
    50                  55                  60


Met Leu Tyr Ile Gly Glu Glu Val Gly Ile Tyr Arg Asp Ala Asp Lys
65                  70                  75                  80


Arg Ala Gly Val Pro Ala Gly Lys Leu Val Glu Ile Asp Ile Ala Val
                85                  90                  95


Asp Pro Cys Glu Gly Thr Asn Leu Cys Ala Tyr Gly Gln Pro Gly Ser
                100                 105                 110


Met Ala Val Leu Ala Ile Ser Glu Lys Gly Gly Leu Phe Ala Ala Pro
                115                 120                 125


Asp Phe Tyr Met Lys Lys Leu Ala Ala Pro Pro Ala Ala Lys Gly Lys
    130                 135                 140


Glu Thr Ser Ile Lys Ser Ala Thr Glu Asn Leu Lys Ile Leu Ser Glu
145                 150                 155                 160


Cys Leu Asp Arg Ala Ile Asp Glu Leu Val Val Val Val Met Asp Arg
                165                 170                 175
```

Pro Arg His Lys Glu Leu Ile Gln Glu Ile Arg Gln Ala Gly Ala Arg
              180   185   190

Val Arg Leu Ile Ser Asp Gly Asp Val Ser Ala Ala Ile Ser Cys Gly
              195   200   205

Phe Ala Gly Thr Asn Thr His Ala Leu Met Gly Ile Gly Ala Ala Pro
      210   215   220

Glu Gly Val Ile Ser Ala Ala Ala Met Arg Cys Leu Gly Gly His Phe
225   230   235   240

Gln Gly Gln Leu Ile Tyr Asp Pro Glu Val Val Lys Thr Gly Leu Ile
              245   250   255

Gly Glu Ser Arg Glu Ser Asn Ile Ala Arg Leu Gln Glu Met Gly Ile
              260   265   270

Thr Asp Pro Asp Arg Val Tyr Asp Ala Asn Glu Leu Ala Ser Gly Gln
              275   280   285

Glu Val Leu Phe Ala Ala Cys Gly Ile Thr Pro Gly Leu Leu Met Glu
      290   295   300

Gly Val Arg Phe Phe Lys Gly Gly Ala Arg Thr Gln Ser Leu Val Ile
305   310   315   320

Ser Ser Gln Ser Arg Thr Ala Arg Phe Val Asp Thr Val His Met Phe
              325   330   335

Asp Asp Val Lys Thr Val Ser Leu Pro Leu Ile Pro Asp Pro Lys Trp
              340   345   350

Arg Pro Glu Arg
              355

<210> 6
<211> 1312
<212> DNA
<213> Synechococcus

<220>

<223> fructose-1,6-bisphosphatase/sedoheptulose-1,7-bisphosphatase from
      Synechococcus PCC 7942

<400> 6
atcgcaacta aagccagaga tgtgaggagg ggatccggcc tttggtagac tcaactgttg   60

```
gaatccccag aagcaatcat ccgtaaggag tcaggacggc gtggagaaga cgatcggtct    120

cgagattatt gaagttgtcg agcaggcagc gatcgcctcg gcccgcctga tgggcaaagg    180

cgaaaagaat gaagccgatc gcgtcgcagt agaagcgatg cgggtgcgga tgaaccaagt    240

ggaaatgctg ggccgcatcg tcatcggtga aggcgagcgc gacgaagcac cgatgctcta    300

tatcggtgaa gaagtgggca tctaccgcga tgcagacaag cgggctggcg taccggctgg    360

caagctggtg gaaatcgaca tcgccgttga cccctgcgaa ggcaccaacc tctgcgccta    420

cggtcagccc ggctcgatgg cagttttggc catctccgag aaaggcggcc tgtttgcagc    480

tcccgacttc tacatgaaga aactggctgc acccccagct gccaaaggca aagagacatc    540

aataaagtcc gcgaccgaaa acctgaaaat tctctcggaa tgtctcgatc gcgccatcga    600

tgaattggtg gtcgtggtca tggatcgtcc ccgccacaaa gagctaatcc aagagatccg    660

ccaagcgggt gcccgcgtcc gtctgatcag cgatggtgac gtttcggccg cgatctcctg    720

cggttttgct ggcaccaaca cccacgccct gatgggcatc ggtgcagctc ccgagggtgt    780

gatttcggca gcagcaatgc gttgcctcgg cgggcacttc caaggccagc tgatctacga    840

cccagaagtg gtcaaaaccg gcctgatcgg tgaaagccgt gagagcaaca tcgctcgcct    900

gcaagaaatg ggcatcaccg atcccgatcg tgtctacgac gcgaacgaac tggcttcggg    960

tcaagaagtg ctgtttgcgg cttgcggtat caccccgggc ttgctgatgg aaggcgtgcg   1020

cttcttcaaa ggcggcgctc gcacccagag cttggtgatc tccagccagt cacggacggc   1080

tcgcttcgtt gacaccgttc acatgttcga cgatgtcaaa acggttagcc tgccgttaat   1140

tcctgatccc aaatggcggc cggagcggta gaacgggtat agctcgatcg cttcggtcgt   1200

tgtttttcag cgaatccatt tgcgatcgct tttcaaaccc ttttttcgtc aaccttcttt   1260

aaacggcctc atgcatctcg cagttgtcgg ctcagccatc ggacagcacc gg           1312
```

```
<210>  7
<211>  133
<212>  DNA
<213>  Nicotiana tabacum

<220>

<223>  psbA promoter

<400>  7
agcttctaca tacaccttgg ttgacacgag tatataagtc atgttatact gttgaataac     60

aagccttcca ttttctattt tgatttgtag aaaactagtg tgcttgggag tccctgatga    120

ttaaataaac caa                                                        133
```

```
<210>  8
<211>  159
```

<212>   DNA
<213>   Nicotiana tabacum

<220>

<223>   rps16 terminator

<400>   8
agcttgaaat tcaattaagg aaataaatta aggaaataca aaaagggggg tagtcatttg   60

tatataactt tgtatgactt ttctcttcta ttttttgta tttcctccct ttccttttct   120

atttgtattt ttttatcatt gcttccattg aattactag   159

<210>   9
<211>   805
<212>   DNA
<213>   Escherichia coli

<220>

<223>   aadA

<400>   9
gatccatggc tcgtgaagcg gttatcgccg aagtatcaac tcaactatca gaggtagttg   60

gcgtcatcga gcgccatctc gaaccgacgt tgctggccgt acatttgtac ggctccgcag   120

tggatggcgg cctgaagcca cacagtgata ttgatttgct ggttacggtg accgtaaggc   180

ttgatgaaac aacgcggcga gctttgatca acgacctttt ggaaacttcg gcttcccctg   240

gagagagcga gattctccgc gctgtagaag tcaccattgt tgtgcacgac gacatcattc   300

cgtggcgtta tccagctaag cgcgaactgc aatttggaga atggcagcgc aatgacattc   360

ttgcaggtat cttcgagcca gccacgatcg acattgatct ggctatcttg ctgacaaaag   420

caagagaaca tagcgttgcc ttggtaggtc cagcggcgga ggaactcttt gatccggttc   480

ctgaacagga tctatttgag gcgctaaatg aaaccttaac gctatggaac tcgccgcccg   540

actgggctgg cgatgagcga aatgtagtgc ttacgttgtc ccgcatttgg tacagcgcag   600

taaccggcaa aatcgcgccg aaggatgtcg ctgccgactg gcaatggag cgcctgccgg   660

cccagtatca gcccgtcata cttgaagcta gacaggctta tcttggacaa gaagaagatc   720

gcttggcctc gcgcgcagat cagttggaag aatttgtcca ctacgtgaaa ggcgagatca   780

ctaaggtagt tggcaaataa ctgca   805

<210>   10
<211>   4591
<212>   DNA
<213>   Artificial sequence

<220>
<223>   synthetic construct

<220>
<223> pLD6

<400>   10
gtggcacttt tcggggaaat gtgcgcggaa cccctatttg tttatttttc taaatacatt   60

caaatatgta tccgctcatg agacaataac cctgataaat gcttcaataa tattgaaaaa   120

ggaagagtat gagtattcaa catttccgtg tcgcccttat tccctttttt gcggcatttt   180

gccttcctgt ttttgctcac ccagaaacgc tggtgaaagt aaaagatgct gaagatcagt   240

tgggtgcacg agtgggttac atcgaactgg atctcaacag cggtaagatc cttgagagtt   300

ttcgccccga agaacgtttt ccaatgatga gcacttttaa agttctgcta tgtggcgcgg   360

tattatcccg tattgacgcc gggcaagagc aactcggtcg ccgcatacac tattctcaga   420

atgacttggt tgagtactca ccagtcacag aaaagcatct tacggatggc atgacagtaa   480

gagaattatg cagtgctgcc ataaccatga gtgataacac tgcggccaac ttacttctga   540

caacgatcgg aggaccgaag gagctaaccg cttttttgca acatggggg atcatgtaa   600

ctcgccttga tcgttgggaa ccggagctga atgaagccat accaaacgac gagcgtgaca   660

ccacgatgcc tgtagcaatg gcaacaacgt tgcgcaaact attaactggc gaactactta   720

ctctagcttc ccggcaacaa ttaatagact ggatggaggc ggataaagtt gcaggaccac   780

ttctgcgctc ggcccttccg gctggctggt ttattgctga taaatctgga gccggtgagc   840

gtgggtctcg cggtatcatt gcagcactgg ggccagatgg taagccctcc cgtatcgtag   900

ttatctacac gacggggagt caggcaacta tggatgaacg aaatagacag atcgctgaga   960

taggtgcctc actgattaag cattggtaac tgtcagacca gtttactca tatatacttt   1020

agattgattt aaaacttcat ttttaattta aaaggatcta ggtgaagatc cttttttgata   1080

atctcatgac caaaatccct taacgtgagt tttcgttcca ctgagcgtca gaccccgtag   1140

aaaagatcaa aggatcttct tgagatcctt tttttctgcg cgtaatctgc tgcttgcaaa   1200

caaaaaaacc accgctacca gcggtggttt gtttgccgga tcaagagcta ccaactcttt   1260

ttccgaaggt aactggcttc agcagagcgc agataccaaa tactgtcctt ctagtgtagc   1320

cgtagttagg ccaccacttc aagaactctg tagcaccgcc tacatacctc gctctgctaa   1380

tcctgttacc agtggctgct gccagtggcg ataagtcgtg tcttaccggg ttggactcaa   1440

gacgatagtt accggataag gcgcagcggt cgggctgaac gggggttcg tgcacacagc   1500

ccagcttgga gcgaacgacc tacaccgaac tgagatacct acagcgtgag ctatgagaaa   1560

gcgccacgct tcccgaaggg agaaaggcgg acaggtatcc ggtaagcggc agggtcggaa   1620

caggagagcg cacgagggag cttccagggg gaaacgcctg gtatctttat agtcctgtcg   1680

ggtttcgcca cctctgactt gagcgtcgat ttttgtgatg ctcgtcaggg gggcggagcc   1740

```
tatggaaaaa cgccagcaac gcggcctttt tacggttcct ggccttttgc tggccttttg  1800

ctcacatgtt ctttcctgcg ttatcccctg attctgtgga taaccgtatt accgcctttg  1860

agtgagctga taccgctcgc cgcagccgaa cgaccgagcg cagcgagtca gtgagcgagg  1920

aagcggaaga gcgcccaata cgcaaaccgc ctctccccgc gcgttggccg attcattaat  1980

gcagctggca cgacaggttt cccgactgga aagcgggcag tgagcgcaac gcaattaatg  2040

tgagttagct cactcattag gcaccccagg ctttacactt tatgcttccg gctcgtatgt  2100

tgtgtggaat tgtgagcgga taacaatttc acacaggaaa cagctatgac catgattacg  2160

ccaagcgcgc aattaaccct cactaaaggg aacaaaagct ggagctccac cgcggtggcg  2220

gccgctctag ttggatttgc tcccccgccg tcgttcaatg agaatggata agaggctcgt  2280

gggattgacg tgaggggca gggatggcta tatttctggg agcgaactcc gggcgaattt  2340

gaagcgcttg gatacagttg tagggaggga tccatggctc gtgaagcggt tatcgccgaa  2400

gtatcaactc aactatcaga ggtagttggc gtcatcgagc gccatctcga accgacgttg  2460

ctggccgtac atttgtacgg ctccgcagtg gatggcggcc tgaagccaca cagtgatatt  2520

gatttgctgg ttacggtgac cgtaaggctt gatgaaacaa cgcggcgagc tttgatcaac  2580

gacctttggg aaacttcggc ttcccctgga gagagcgaga ttctccgcgc tgtagaagtc  2640

accattgttg tgcacgacga catcattccg tggcgttatc cagctaagcg cgaactgcaa  2700

tttggagaat ggcagcgcaa tgacattctt gcaggtatct tcgagccagc cacgatcgac  2760

attgatctgg ctatcttgct gacaaaagca agagaacata gcgttgcctt ggtaggtcca  2820

gcggcggagg aactctttga tccggttcct gaacaggatc tatttgaggc gctaaatgaa  2880

accttaacgc tatggaactc gccgcccgac tgggctggcg atgagcgaaa tgtagtgctt  2940

acgttgtccc gcatttggta cagcgcagta accggcaaaa tcgcgccgaa ggatgtcgct  3000

gccgactggg caatggagcg cctgccggcc cagtatcagc ccgtcatact tgaagctaga  3060

caggcttatc ttggacaaga agaagatcgc ttggcctcgc gcgcagatca gttggaagaa  3120

tttgtccact acgtgaaagg cgagatcact aaggtagttg gcaaataact gcaggatcct  3180

ggcctagtct ataggaggtt ttgaaaagaa aggagcaata atcattttct tgttctatca  3240

agagggtgct attgctcctt tcttttttc tttttatta tttactagta ttttacttac  3300

atagacttt ttgtttacat tatagaaaaa gaaggagagg ttattttctt gcatttattc  3360

atgattgagt attctatttt gattttgtat ttgtttaaaa ttgtagaaat agaacttgtt  3420

tctcttcttg ctaatgttac tatatctttt tgattttttt tttccaaaaa aaaatcaaat  3480

tttgacttct tcttatctct tatctttgaa tatctcttat ctttgaaata ataatatcat  3540

tgaaataaga aagaagagct atattcgaag cttctacata caccttggtt gacacgagta  3600
```

```
tataagtcat gttatactgt tgaataacaa gccttccatt ttctattttg atttgtagaa    3660

aactagtgtg cttgggagtc cctgatgatt aaataaacca agatctaaaa ggagaaatta    3720

agcatgctct agatcgatga attcgccctt ccgaagcttg aaattcaatt aaggaaataa    3780

attaaggaaa tacaaaaagg ggggtagtca tttgtatata actttgtatg acttttctct    3840

tctatttttt tgtatttcct ccctttcctt ttctatttgt attttttat cattgcttcc     3900

attgaattac tagtcgacct cgaggggggg cccggtaccc aattcgccct atagtgagtc    3960

gtattacgcg cgctcactgg ccgtcgtttt acaacgtcgt gactgggaaa accctggcgt    4020

tacccaactt aatcgccttg cagcacatcc ccctttcgcc agctggcgta atagcgaaga    4080

ggcccgcacc gatcgccctt cccaacagtt gcgcagcctg aatggcgaat gggacgcgcc    4140

ctgtagcggc gcattaagcg cggcgggtgt ggtggttacg cgcagcgtga ccgctacact    4200

tgccagcgcc ctagcgcccg ctcctttcgc tttcttccct tcctttctcg ccacgttcgc    4260

cggctttccc cgtcaagctc taaatcgggg gctcccttta gggttccgat ttagtgcttt    4320

acggcacctc gaccccaaaa aacttgatta gggtgatggt tcacgtagtg ggccatcgcc    4380

ctgatagacg gtttttcgcc ctttgacgtt ggagtccacg ttctttaata gtggactctt    4440

gttccaaact ggaacaacac tcaaccctat ctcggtctat tcttttgatt tataagggat    4500

tttgccgatt tcggcctatt ggttaaaaaa tgagctgatt taacaaaaat ttaacgcgaa    4560

ttttaacaaa atattaacgc ttacaattta g                                    4591
```

<210> 11
<211> 51
<212> DNA
<213> Artificial sequence

<220>
<223> synthetic construct

<220>
<223> multi-cloning regions

<400> 11
```
ccaagatcta aaaggagaaa ttaagcatgc tctagatcga tgaattcgcc c              51
```


<210> 12
<211> 142
<212> DNA
<213> Nicotiana tabacum

<220>
<223> rrn promoter

<400> 12
```
ctagttggat ttgctccccc gccgtcgttc aatgagaatg gataagaggc tcgtgggatt    60
```

gacgtgaggg ggcagggatg gctatatttc tgggagcgaa ctccgggcga atttgaagcg   120

cttggataca gttgtaggga gg   142

<210> 13
<211> 390
<212> DNA
<213> Nicotiana tabacum

<220>
<223> psbA terminator

<400> 13
gatcctggcc tagtctatag gaggttttga aaagaaagga gcaataatca ttttcttgtt   60

ctatcaagag ggtgctattg ctcctttctt tttttctttt tatttattta ctagtatttt   120

acttacatag actttttgt ttacattata gaaaagaag gagaggttat tttcttgcat   180

ttattcatga ttgagtattc tattttgatt ttgtatttgt ttaaaattgt agaaatagaa   240

cttgtttctc ttcttgctaa tgttactata tcttttgat ttttttttc caaaaaaaa   300

tcaaattttg acttcttctt atctcttatc tttgaatatc tcttatcttt gaataataa   360

tatcattgaa ataagaaaga agagctatat   390

<210> 14
<211> 5581
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic construct

<220>
<223> pLD200

<400> 14
tcgcgcgttt cggtgatgac ggtgaaaacc tctgacacat gcagctcccg gagacggtca   60

cagcttgtct gtaagcggat gccgggagca gacaagcccg tcagggcgcg tcagcgggtg   120

ttggcgggtg tcggggctgg cttaactatg cggcatcaga gcagattgta ctgagagtgc   180

accatatgcg gtgtgaaata ccgcacagat gcgtaaggag aaaataccgc atcaggcgcc   240

attcgccatt caggctgcgc aactgttggg aagggcgatc ggtgcgggcc tcttcgctat   300

tacgccagct ggcgaaaggg ggatgtgctg caaggcgatt aagttgggta acgccagggt   360

tttcccagtc acgacgttgt aaaacgacgg ccagtgaatt catgagttgt agggagggat   420

ttatgtcacc acaaacagag actaaagcaa gtgttggatt caaagctggt gttaaagagt   480

acaaattgac ttattatact cctgagtacc aaaccaagga tactgatata ttggcagcat   540

tccgagtaac tcctcaacct ggagttccac ctgaagaagc aggggccgcg gtagctgccg   600

```
aatcttctac tggtacatgg acaactgtat ggaccgatgg acttaccagc cttgatcgtt    660

acaaagggcg atgctaccgc atcgagcgtg ttgttggaga aaaagatcaa tatattgctt    720

atgtagctta ccctttagac cttttgaag  aaggttctgt taccaacatg tttacttcca    780

ttgtaggtaa cgtatttggg ttcaaagccc tgcgcgctct acgtctggaa gatctgcgaa    840

tccctcctgc ttatgttaaa actttccaag gtccgcctca tgggatccaa gttgaaagag    900

ataaattgaa caagtatggt cgtcccctgt tgggatgtac tattaaacct aaattggggt    960

tatctgctaa aaactacggt agagccgttt atgaatgtct cgcggtgga  cttgatttta   1020

ctaaagatga tgagaacgtg aactcacaac catttatgcg ttggagagat cgtttcttat   1080

tttgtgccga agcactttat aaagcacagg ctgaaacagg tgaaatcaaa gggcattact   1140

tgaatgctac tgcaggtaca tgcgaagaaa tgatcaaaag agctgtattt gctagagaat   1200

tgggcgttcc gatcgtaatg catgactact taacgggggg attcaccgca aatactagct   1260

tggctcatta ttgccgagat aatggtctac ttcttcacat ccaccgtgca atgcatgcgg   1320

ttattgatag acagaagaat catggtatcc acttccgggt attagcaaaa gcgttacgta   1380

tgtctggtgg agatcatatt cactctggta ccgtagtagg taaacttgaa ggtgaaagag   1440

acataacttt gggctttgtt gatttactgc gtgatgattt tgttgaacaa gatcgaagtc   1500

gcggtattta tttcactcaa gattgggtct ctttaccagg tgttctaccc gtggcttcag   1560

gaggtattca cgtttggcat atgcctgctc tgaccgagat ctttggggat gattccgtac   1620

tacagttcgg tggaggaact ttaggacatc cttggggtaa tgcgccaggt gccgtagcta   1680

atcgagtagc tctagaagca tgtgtaaaag ctcgtaatga aggacgtgat cttgctcagg   1740

aaggtaatga aattattcgc gaggcttgca aatggagccc ggaactagct gctgcttgtg   1800

aagtatggaa agagatcgta tttaattttg cagcagtgga cgttttggat aagtaaaaac   1860

agtagacatt agcagataaa ttagcaggaa ataaagaagg ataaggagaa agaactcaag   1920

taattatcct tcgttctctt aattgaattg caattaaact cggcccaatc ttttactaaa   1980

aggattgagc cgaatacaac aaagattcta ttgcatatat tttgactaag tatatactta   2040

cctagatata caagatttga aatacaaaat ctagaaaact aaatcaaaat ctaagactca   2100

aatctttcta ttgttgtctt ggatcgcggc cgcgctagcg tcgacgatcc ttaggattgg   2160

tatattcttt tctatcctgt agtttgtagt ttccctgaat caagccaagt atcacacctc   2220

tttctaccca tcctgtatat tgtccccttt gttccgtgtt gaaatagaac cttaatttat   2280

tacttatttt tttattaaat tttagatttg ttagtgatta gatattagta ttagacgaga   2340

ttttacgaaa caattatttt tttatttctt tataggagag acaaatctc  ttttttcgat   2400

gcgaatttga cacgacatag gagaagccgc cctttattaa aaattatatt attttaaata   2460

atataaaggg ggttccaaca tattaatata tagtgaagtg ttcccccaga ttcagaactt   2520
```

```
tttttcaata ctcacaatcc ttattagtta ataatcctag tgattggatt tctatgctta   2580

gtctgatagg aaataagata ttcaaataaa taattttata gcgaatgact attcatctat   2640

tgtattttca tgcaaatagg gggcaagaaa actctatgga aagatggtgg tttaattcga   2700

tgttgtttaa gaaggagttc gaacgcaggt gtgggctaaa taaatcaatg ggcagtcttg   2760

gtcctattga aaataccaat gaagatccaa atcgaaaagt gaaaaacatt catagttgga   2820

ggaatcgtga caattctagt tgcagtaatg ttgattattt attcggcgtt aaagacattc   2880

ggaatttcat ctctgatgac actttttag ttagtgatag gaatggagac agttattcca   2940

tctattttga tattgaaaat catatttttg agattgacaa cgatcattct tttctgagtg   3000

aactagaaag ttctttttat agttatcgaa actcgaatta tcggaataat ggatttaggg   3060

gcgaagatcc ctactataat tcttacatgt atgatactca atatagttgg aataatcaca   3120

ttaatagttg cattgatagt tatcttcagt ctcaaatctg tatagatact tccattataa   3180

gtggtagtga gaattacggt gacagttaca tttatagggc cgtttgtggt ggtgaaagtc   3240

gaaatagtag tgaaaacgag ggttccagta gacgaactcg cacgaagggc agtgatttaa   3300

ctataagaga aagttctaat gatctcgacc tgcaggcatg caagcttggc gtaatcatgg   3360

tcatagctgt ttcctgtgtg aaattgttat ccgctcacaa ttccacacaa catacgagcc   3420

ggaagcataa agtgtaaagc ctggggtgcc taatgagtga gctaactcac attaattgcg   3480

ttgcgctcac tgcccgcttt ccagtcggga aacctgtcgt gccagctgca ttaatgaatc   3540

ggccaacgcg cggggagagg cggtttgcgt attgggcgct cttccgcttc ctcgctcact   3600

gactcgctgc gctcggtcgt tcggctgcgg cgagcggtat cagctcactc aaaggcggta   3660

atacggttat ccacagaatc aggggataac gcaggaaaga acatgtgagc aaaaggccag   3720

caaaaggcca ggaaccgtaa aaaggccgcg ttgctggcgt ttttccatag gctccgcccc   3780

cctgacgagc atcacaaaaa tcgacgctca agtcagaggt ggcgaaaccc gacaggacta   3840

taaagatacc aggcgtttcc ccctggaagc tccctcgtgc gctctcctgt ccgaccctg   3900

ccgcttaccg gatacctgtc cgcctttctc ccttcgggaa gcgtggcgct ttctcaatgc   3960

tcacgctgta ggtatctcag ttcggtgtag gtcgttcgct ccaagctggg ctgtgtgcac   4020

gaaccccccg ttcagcccga ccgctgcgcc ttatccggta actatcgtct tgagtccaac   4080

ccggtaagac acgacttatc gccactggca gcagccactg gtaacaggat tagcagagcg   4140

aggtatgtag gcggtgctac agagttcttg aagtggtggc ctaactacgg ctacactaga   4200

aggacagtat ttggtatctg cgctctgctg aagccagtta ccttcggaaa aagagttggt   4260

agctcttgat ccggcaaaca aaccaccgct ggtagcggtg gtttttttgt ttgcaagcag   4320

cagattacgc gcagaaaaaa aggatctcaa gaagatcctt tgatctttc tacggggtct   4380
```

```
gacgctcagt ggaacgaaaa ctcacgttaa gggattttgg tcatgagatt atcaaaaagg    4440

atcttcacct agatcctttt aaattaaaaa tgaagtttta aatcaatcta aagtatatat    4500

gagtaaactt ggtctgacag ttaccaatgc ttaatcagtg aggcacctat ctcagcgatc    4560

tgtctatttc gttcatccat agttgcctga ctccccgtcg tgtagataac tacgatacgg    4620

gagggcttac catctggccc cagtgctgca atgataccgc gagacccacg ctcaccggct    4680

ccagatttat cagcaataaa ccagccagcc ggaagggccg agcgcagaag tggtcctgca    4740

actttatccg cctccatcca gtctattaat tgttgccggg aagctagagt aagtagttcg    4800

ccagttaata gtttgcgcaa cgttgttgcc attgctacag gcatcgtggt gtcacgctcg    4860

tcgtttggta tggcttcatt cagctccggt tcccaacgat caaggcgagt tacatgatcc    4920

cccatgttgt gcaaaaaagc ggttagctcc ttcggtcctc cgatcgttgt cagaagtaag    4980

ttggccgcag tgttatcact catggttatg gcagcactgc ataattctct tactgtcatg    5040

ccatccgtaa gatgcttttc tgtgactggt gagtactcaa ccaagtcatt ctgagaatag    5100

tgtatgcggc gaccgagttg ctcttgcccg gcgtcaatac gggataatac cgcgccacat    5160

agcagaactt taaaagtgct catcattgga aaacgttctt cggggcgaaa actctcaagg    5220

atcttaccgc tgttgagatc cagttcgatg taacccactc gtgcacccaa ctgatcttca    5280

gcatctttta ctttcaccag cgtttctggg tgagcaaaaa caggaaggca aaatgccgca    5340

aaaaagggaa taagggcgac acggaaatgt tgaatactca tactcttcct ttttcaatat    5400

tattgaagca tttatcaggg ttattgtctc atgagcggat acatatttga atgtatttag    5460

aaaaataaac aaatagggggt tccgcgcaca tttccccgaa aagtgccacc tgacgtctaa    5520

gaaaccatta ttatcatgac attaacctat aaaaataggc gtatcacgag gccctttcgt    5580

c                                                                    5581
```

<210> 15
<211> 1434
<212> DNA
<213> Nicotiana tabacum

<220>
<223> rbcL

<400> 15
```
atgtcaccac aaacagagac taaagcaagt gttggattca aagctggtgt taaagagtac    60

aaattgactt attatactcc tgagtaccaa accaaggata ctgatatatt ggcagcattc    120

cgagtaactc ctcaacctgg agttccacct gaagaagcag gggccgcggt agctgccgaa    180

tcttctactg gtacatggac aactgtatgg accgatggac ttaccagcct tgatcgttac    240

aaagggcgat gctaccgcat cgagcgtgtt gttggagaaa aagatcaata tattgcttat    300
```

```
gtagcttacc ctttagacct ttttgaagaa ggttctgtta ccaacatgtt tacttccatt      360

gtaggtaacg tatttggggtt caaagccctg cgcgctctac gtctggaaga tctgcgaatc     420

cctcctgctt atgttaaaac tttccaaggt ccgcctcatg ggatccaagt tgaaagagat      480

aaattgaaca agtatggtcg tcccctgttg ggatgtacta ttaaacctaa attggggtta      540

tctgctaaaa actacggtag agccgtttat gaatgtcttc gcggtggact tgattttact     600

aaagatgatg agaacgtgaa ctcacaacca tttatgcgtt ggagagatcg tttcttattt      660

tgtgccgaag cactttataa agcacaggct gaaacaggtg aaatcaaagg gcattacttg      720

aatgctactg caggtacatg cgaagaaatg atcaaaagag ctgtatttgc tagagaattg      780

ggcgttccga tcgtaatgca tgactactta acggggggat tcaccgcaaa tactagcttg      840

gctcattatt gccgagataa tggtctactt cttcacatcc accgtgcaat gcatgcggtt      900

attgatagac agaagaatca tggtatccac ttccgggtat tagcaaaagc gttacgtatg      960

tctggtggag atcatattca ctctggtacc gtagtaggta aacttgaagg tgaaagagac     1020

ataactttgg gctttgttga tttactgcgt gatgattttg ttgaacaaga tcgaagtcgc     1080

ggtatttatt tcactcaaga ttgggtctct ttaccaggtg ttctacccgt ggcttcagga     1140

ggtattcacg tttggcatat gcctgctctg accgagatct ttggggatga ttccgtacta     1200

cagttcggtg gaggaacttt aggacatcct tggggtaatg cgccaggtgc cgtagctaat     1260

cgagtagctc tagaagcatg tgtaaaagct cgtaatgaag gacgtgatct tgctcaggaa     1320

ggtaatgaaa ttattcgcga ggcttgcaaa tggagcccgg aactagctgc tgcttgtgaa     1380

gtatggaaag agatcgtatt taattttgca gcagtggacg ttttggataa gtaa           1434
```

```
<210>   16
<211>   705
<212>   DNA
<213>   Nicotiana tabacum

<220>
<223>   accD

<400>   16
aatgactatt catctattgt attttcatgc aaataggggg caagaaaact ctatggaaag     60

atggtggttt aattcgatgt tgtttaagaa ggagttcgaa cgcaggtgtg ggctaaataa     120

atcaatgggc agtcttggtc ctattgaaaa taccaatgaa gatccaaatc gaaaagtgaa     180

aaacattcat agttggagga atcgtgacaa ttctagttgc agtaatgttg attatttatt     240

cggcgttaaa gacattcgga atttcatctc tgatgacact tttttagtta gtgataggaa     300

tggagacagt tattccatct atttttgatat tgaaaatcat atttttgaga ttgacaacga     360

tcattctttt ctgagtgaac tagaaagttc ttttttatagt tatcgaaact cgaattatcg     420
```

```
gaataatgga tttaggggcg aagatcccta ctataattct tacatgtatg atactcaata      480

tagttggaat aatcacatta atagttgcat tgatagttat cttcagtctc aaatctgtat      540

agatacttcc attataagtg gtagtgagaa ttacggtgac agttacattt atagggccgt      600

ttgtggtggt gaaagtcgaa atagtagtga aaacgagggt tccagtagac gaactcgcac      660

gaagggcagt gatttaacta taagagaaag ttctaatgat ctcga                      705
```

<210> 17
<211> 21
<212> DNA
<213> Artificial sequence

<220>
<223> synthetic construct

<220>
<223> polylinker

<400> 17
cgcggccgcg ctagcgtcga c   21

<210> 18
<211> 7
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic construct

<220>
<223> Shine-Dalgarno sequence

<400> 18
aggaggu   7